INSTRUCTION BOOK

1020B

MODEL 1020

MEGOHMMETER

FREED TRANSFORMER CO. INC.

INSTRUMENT DIVISION

MP MASTER

MA34243

INSTRUCTION BOOK

MODEL 1000 1020B

MEGOHMMETER

FREED TRANSFORMER CO. INC.

INSTRUMENT DIVISION

OPERATING INSTRUCTIONS FOR FREED TYPE 1020-B MEGOHMMETER

DESCRIPTION:

The instrument is a direct reading precision balanced electronic ohmmeter with a 500 volt d-c test potential included as a part of the unit. The insulation resistance is measured in six overlapping ranges and is indicated by a four inch meter, protected against overload. A relay, operated from the front panel disconnects the high voltage from the test terminals and eliminates all danger of shock due to exposed high potential. In the stand-by position (when push-button is released) a resistance between the high voltage terminal and chassis (ground) discharges condenser under test, eliminating danger of shock when disconnecting the component.

SPECIFICATIONS

RANGE:

1 megohm to 2,000,000 megohms in six overlapping ranges selected by a multiplier switch.

SCALE:

Resistance is indicated on easy to read four inch meter which is protected against overload.

ACCURACY:

Plus or minus 3% on resistance values up to 100,00 megohms; plus or minus 5% from 100,000 to 2,000,000 megohms.

VOLTAGES ON UNKNOWN:

The voltage applied to the unknown terminals is 500 volts d-c and is independent, (less than 1%) of the value of the unknown.

STABILITY:

Line voltage variations from 105-125 volts will cause less than 2% variation in the meter reading.

TERMINALS:

Four terminals are provided, two for connecting the unknown, one guard and one ground. As a safety feature, when pushbutton is released, the test voltage is removed from the terminals. This permits connections to be made without danger of shock in all positions of the selector switch.

CONTROLS:

A range selector, zero adjust and calibration switch. Zero adjust control for setting meter scale to infinity. Pushbutton switch for activating relay which applies test voltage to terminals and when released discharges capacitive component of the unknown. A.C. on-off switch.

TUBES:

1 --- 6C4	1 --- 2X2-A
1 --- 6AU6	1 --- 6X4
1 --- 12AU7	1 --- OB2

1 --- 5651

POWER SUPPLY:

105-125 volts A.C. 50-60 cycles 30 watts.

CABINET:

Portable and of all metal construction.

DIMENSIONS:

9½ X 10½ X 8 inches.

NET WEIGHT:

18 pounds.

ACCESSORIES SUPPLIED:

Test leads with interchangeable tips consisting of color coded test prods and alligator clips.

OPERATING PROCEDURE

The instrument is ready to operate as received. Turn the power switch to the "on" position and allow a five minute warm up period. Turn the range selector switch to the "zero adjust" position. Depress the pushbutton and adjust the "zero adjust" control on the front panel until the meter reads infinity. Then turn to the "Calibrate" position of the range selector switch. When the pushbutton is pressed, an internal standard is connected across the terminals and the meter should read 500V. Normally no adjustment should be necessary.

The instrument may now be used on any range without readjustment of the "zero adjust". Only on the highest two ranges may a slight readjustment be necessary.

For measuring the leakage resistance of insulation materials, condensers, cables, motors and transformer windings, make terminal connections as shown in Figure 1. The value of the unknown is the meter reading multiplied by the setting of the range selector switch.

The leakage resistance of capacitors is measured in exactly the same manner as the resistance of other insulation materials, except that the time constants involved require some precaution.

To assure a rapid rate of charge when testing condensers of high capacity, turn the range selector switch to the 1 Meg position and press the test button and with the button held in this position, increase setting of the range selector switch until the condenser is fully charged. This is indicated when the meter stops drifting.

The instrument has been designed to measure leakage resistance of grounded core transformers, and leakage between two wires of a multiconductor cable. For terminal connections see Figure 2. Note that for all other applications, the "Ground" terminal is strapped to the "Guard" terminal.

SERVICING:

The servicing of this instrument by the user is not recommended. The only operations that can be performed by the user are tube renewal and adjustments.

COARSE ZERO ADJUST:

This control is mounted on the side of the 12AU7 chassis and is in parallel with the "zero adjust" control on the front panel. Adjustment of this control is only necessary when a new 12AU7 has to be used, or when the 12AU7 loses it's balance. To adjust: Allow the instrument to warm up for 10-15 minutes, set the "zero adjust" control to its mid-position, set range selector switch to "zero adjust" until the meter reads infinity.

500 VOLT ADJUST:

This control is accessible through the side of the cabinet. It should only be adjusted, if after proper zero setting of the instrument, the meter does not read 500 volt when the range selector switch is in the "Calibration" position. To adjust: Connect a high impedance AC voltmeter (750,000 ohms or above) across the "Ground" and "500 volt" terminals. Press test button and standard meter should read 500 volts. If not, the "500 volt" adjustment should be made.

SCALE ADJUST:

If, after the above adjustments have been made, the megohmmeter does not read "500 volts" in the "Calibration" position of the range selector switch, adjust the "Scale Adjustment" so that the meter reads properly.

PARTS LIST FOR 1020-B MEGOHMMETER

TRANSFORMERS

T1	Freed # 24038	Power Transformer
T2	Freed # 24039	Power Transformer

CONDENSERS

C1	.25 mfd	1000V	Bathtub
C2-3	10-10 mfd	450V	Electrolytic
C4	.1 mfd	200V	Paper

RESISTORS

R1	1K	1w	1%
R2	10K	1w	1%
R3	100K	1w	1%
R4	1 meg	1w	1%
R5	10 meg	1w	1%
R6	100 meg	2w	1%
R7	500 ohm	1w	1%
R8	100 meg	2w	1%
R9	1 meg	1w	1%
R10	470K	1w	10%
R11	10K	zero adjust potentionmeter	
R12	5K	"	
R13	10K	1w	1%
R14	2.5K	scale adjust potentionmeter	
R15	10K	1w	1%
R16	7.5K	½w	5%
R17	100K	½w	10%
R18	340K	4w	10%
R19	100K	½w	10%
R20	510K	2w	5%
R21	20K	500 volt adjust potentionmeter	
R22	1 meg	½w	10%
R23	82K	½w	10%
R24	91K	2w	5%
R25	4K	5w	5%
R26	47K	½w	10%
R27	47K	½w	10%
R28	22K	½w	10%

TEST CONNECTIONS FOR MODEL 1020-B MEGOHMMETER

RESISTANCE MEASUREMENTS

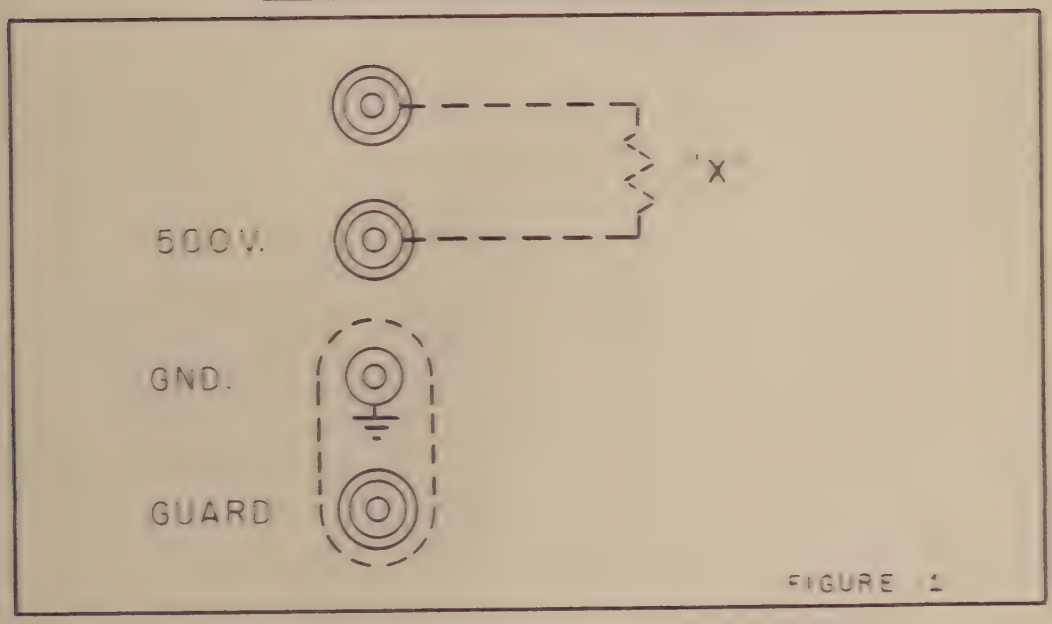


FIGURE 1

LEAKAGE RESISTANCE MEASURMENT WITH CORE GROUNDED

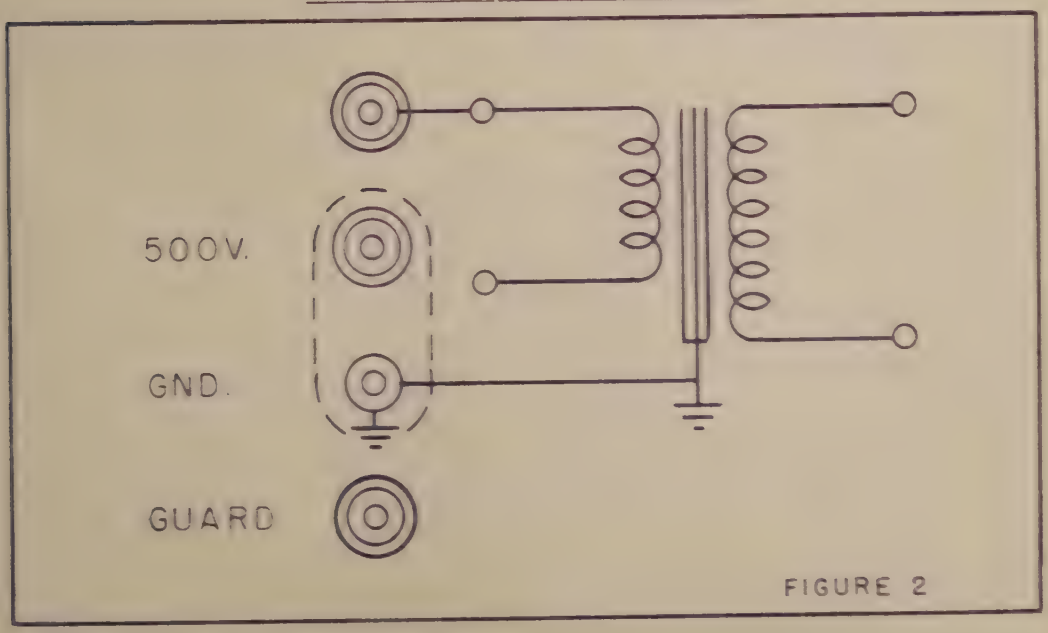
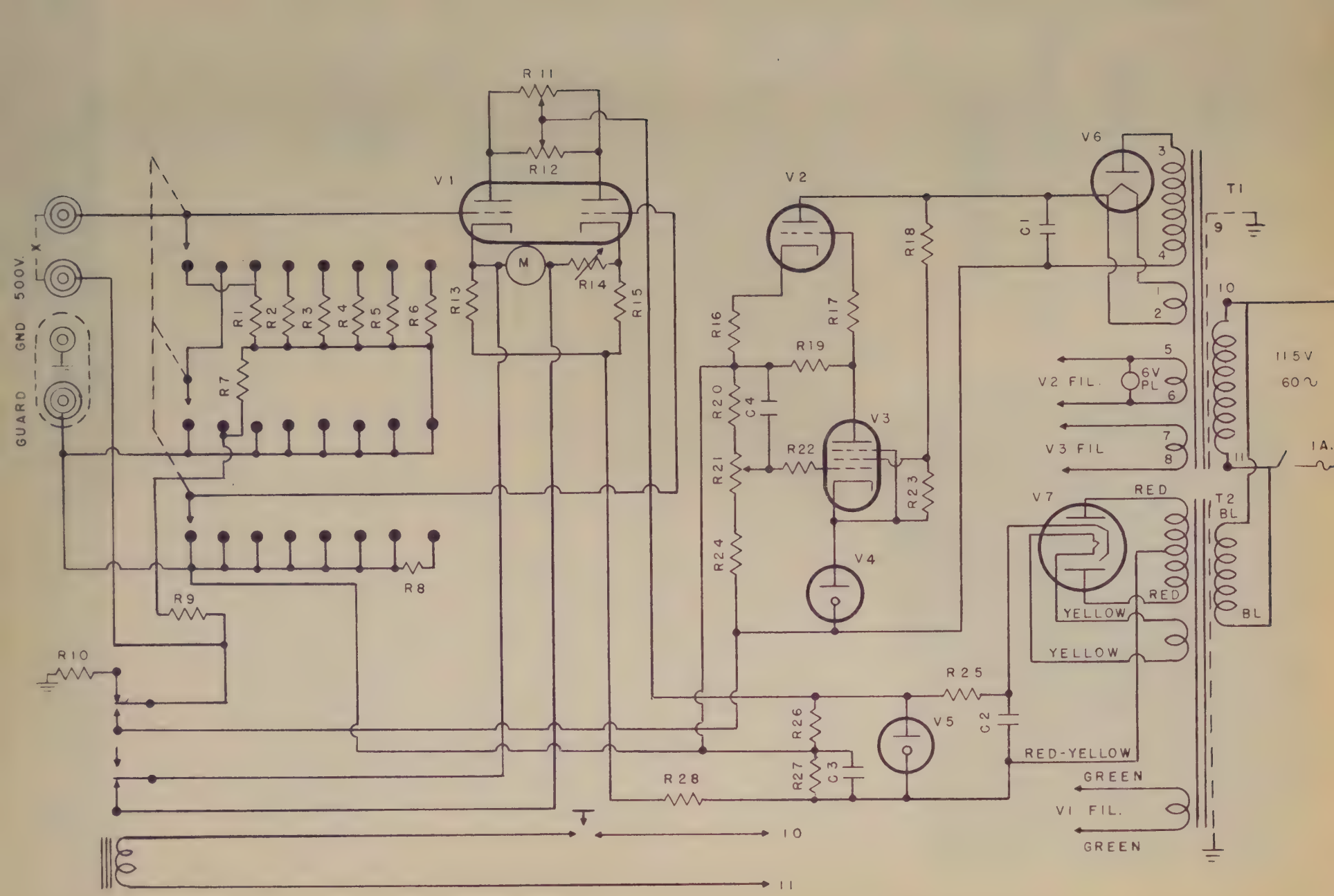


FIGURE 2



MEGOHMMETER 1020-B

TYPE 1110-A

Incremental

INDUCTANCE BRIDGE

Uses: The Incremental Inductance Bridge is designed for measuring the inductance of Iron Core components at any frequency up to 10,000 cycles. Inductors can be measured with a superimposed direct current, therefore, the bridge will measure the incremental inductance of coils. The bridge can be used for determination of storage factor, "Q", either at a given frequency in function of the applied voltage or at a given voltage in function of the applied frequency. The bridge can be used by the manufacturers of iron core components, such as filter chokes, high Q coils, and iron core audio and supersonic frequency components. Due to its very wide inductance range the instrument can be used as a general purpose laboratory inductance bridge.

Description:

The bridge is a conventional Owen Bridge and measures inductors in terms of a standard condenser and resistor. Special circuit arrangements make it possible to superimpose a direct current through the unknown inductor and one arm of the bridge. The shielded built-in Isolation Transformer is capable of transferring high A.C. power from an A.C. line or audio frequency source to the arms of the bridge. All controls are available from the front panel. The switching from one range to another is accomplished by a five position push-button switch. The Inductor value is read directly on a four dial decade. The effective resistance of the inductance is measured in terms of its conductance and is read directly in mhos on a four dial decade.

Features:

The inductance and conductance are read directly on four dial decades. The direct reading feature avoids lengthy computation of inductance in terms of standard resistors and condensers. A very high inductance range, wide frequency range, and means of superimposing high values of direct current are the outstanding features of the bridge. The process of balancing the bridge is easy and rapidly convergent. The conditions of balance of the resistive and reactive component are independent. The balance does not depend on frequency of wave form. The value of inductance as read from the dial settings on the bridge is nominally independent of frequency and also independent of the storage factor Q of the inductor.

Specifications:

INDUCTANCE RANGES: One millihenry to one thousand henries in five ranges. Inductance values are read directly from a four dial decade and a multiplier switch. The last range may be extended to 10,000 henries through the use of an external resistance.

CONDUCTANCE RANGES: One micromho to one mho in five ranges, read directly from a four dial decade and a multiplier switch. This conductance represents the reciprocal of the A.C. resistance of the coil.

"Q" RANGE: "Q" is measured as the product of Inductance (L) and Conductance (G). The range of "Q" measured on this bridge is 0.5 to 100. Measurement of inductance is independent of the values of "Q".

ACCURACY: 1% through the frequency range from 60-1000 cycles, 2% for frequencies from 1000 to 10,000 cycles. This accuracy is decreased for extreme positions of the multiplier. Conductance measurements 5% from 60-1000 cycles.

FREQUENCY RANGE: The bridge is calibrated and adjusted at both 60 and 1000 cycles, but can be used at any frequency up to 10,000 cycles. Errors resulting from stray capacity increase with frequency. Coils having a high inductance should be measured at a low frequency to avoid resonance effect.

RANGE OF SUPERIMPOSED D.C.

On multiplier switch position L X 100, the D.C. is limited to 10 ma.
On the position L X 10, the D.C. is limited to 250 ma.
On all other positions, the D.C. can be one ampere maximum.

TEMPERATURE AND HUMIDITY EFFECTS: The readings of the bridge are unaffected by temperature and humidity variations of 65° F. to 95° F. and 0 to 90%.

MOUNTING: The bridge is supplied in a walnut cabinet or on special order for standard rack mounting.

DIMENSIONS:

	W	D	H
Rack:	19″	8″	14″
Cabinet:	21″	8″	14⅝″

NET WEIGHT: Rack — 37 lbs.; Cabinet — 48 lbs.

Printed in U.S.A.

FREED TRANSFORMER COMPANY, Inc.
Instruments Division
1718-36 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

TYPE 1150 UNIVERSAL BRIDGE

Uses: The type #1150 Universal Bridge is a general purpose audio frequency bridge. The bridge is used for inductance and capacitance measurements. It is the most useful communication laboratory bridge when used for measurements of reactive and resistive components, phase angles of two and four terminal networks, and input impedance of equalizers and filters at audio frequencies. The Universal Bridge is a valuable instrument for laboratory, production and acceptance testing of air and iron core inductors, transformers, paper and mica condensers.

Description:

The type #1150 Universal Bridge is composed of one fixed ratio arm, two variable arms and shielded transformer. A wide capacitance and inductance range is obtained by five ratio arms giving multiplying factors from 1 to 10,000 in decade steps. The ratio arm is controlled by a five position push-button switch. Both variable arms are composed of four precision decade resistors. By using an external condenser standard the bridge can be set up as a Maxwell Bridge, Hay Bridge, Resonance Bridge, Series Resistance Condenser Bridge, or Parallel Resistance Condenser Bridge.

The first three bridge combinations derive their greatest importance from the fact that they permit the measurements of inductance in terms of capacitance standards which are generally superior and more convenient than inductance standards. In the case of Series and Parallel Resistance Condenser Bridges, the unknown condenser is compared to a standard condenser. In order to maintain a high degree of accuracy, the two variable arms of the bridge are made of four dial decade resistors. The nominal value of the ratio arm and the two variable arms is chosen in a way to avoid laborious calculations. For all practical purposes the Universal Bridge has the rapidity and convenience of measurements of a direct reading instrument. A special shielded transformer makes the bridge balance independent of the type of generator and detector used. The reading of the bridge is independent of its surroundings and the position of the operator. To achieve this, the bridge is very carefully shielded, and the shield connected to ground.

Furthermore, all variable controls have their shafts grounded. The two variable arms of the bridge are accessible from the front panel. The range of the bridge can be extended by using external standards. The bridge is calibrated for an accuracy of ½% at 1000 cycles. The bridge can be used throughout the frequency spectrum from 20 cycles to 20,000 cycles. Due to the distributed capacities of the arms of the bridge the accuracy of the bridge is decreased above 10,000 cycles. The accuracy of the bridge is decreased for the largest value of the ratio arm.

Features:

The Universal Bridge offers a variety of five possible bridge circuits. A wide range of capacitance, inductance, impedance, and phase angle measurement can be made throughout the frequency spectrum from 20 cycles to 20,000 cycles.

By using decade resistors in the variable arms the unknown can be measured with four significant figures.

Operation is simple and both terminals and controls are arranged for convenience and ease of measurements.

Specifications:

FREQUENCY RANGE: The bridge can be used at frequencies from 20 cycles to 20,000 cycles.

ACCURACY: All resistors of the bridge arms are adjusted to 0.1%. The absolute accuracy of measurement will depend upon the accuracy of standards used.

INDUCTANCE RANGE: The bridge will measure inductance of coils from 0.1 mh to 1000 henries with an accuracy of 0.5% at 1000 cycles.

CAPACITANCE RANGE: Condensers from .001 mf to 1 mf can be measured to within 0.5% at 1000 cycles. Condensers below .001 mf should be measured by the substitution method.

MOUNTING: The bridge is supplied in a walnut cabinet or on special order for standard rack mounting.

DIMENSIONS:

W	D	H
19″	x 8½″	x 12″

WEIGHT: 32 lbs.

Printed in U.S.A.

FREED TRANSFORMER COMPANY, Inc.
Instruments Division
1718-36 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

FREED

Null Detector AND *Vacuum Tube* VOLTMETER TYPE No. 1210

Uses: The Type 1210 Null Detector and Vacuum Tube Voltmeter is primarily designed for bridge measurements. The Null Detector indicates the balance of the bridge, and the Vacuum Tube Voltmeter indicates the voltage across the unknown two terminal or four terminal network. The three selective circuits provide means for sharply tuning the instrument to audio frequencies commonly used for measurements. The Vacuum Tube Voltmeter can be used as a general purpose audio Vacuum Tube Voltmeter.

Description:

The Type 1210 Null Detector and Vacuum Tube Voltmeter is a combination of the Model 1140 Null Detector Amplifier, and a modified model 1060 high input impedance Vacuum Tube Voltmeter. Both instruments are independent and feed two separate 4" meters.

The Null Detector consists of a high gain linear amplifier with a 30 Db input attenuator in addition to the variable gain control. A four inch panel meter provides visual null indications. The instrument can be used either as a linear amplifier or selective amplifier. The response of the meter circuit is approximately logarithmic over a 40 Db voltage range. Resonant circuits tuned to 60 cycles – 400 cycles and 1000 cycles limit the amplifier transmission characteristics to the three audio frequencies commonly used for bridge measurements. The Vacuum Tube Voltmeter is composed of an RC Coupled Multistage amplifier, a bridge rectifier and a four inch meter calibrated both in volts (0-150) and in decibels (−6 to + 3 DB). A high amount of degeneration is used in the AC amplifier.

Connections to both the Null Detector and the Vacuum Tube Voltmeter are made by using conventional binding posts. The input circuits are isolated from D.C. by blocking Condensers. All functional switching for both the Null Detector and Vacuum Tube Voltmeter are made by two five position pushbutton switches.

Features:

The Null Detector is designed for maximum usefulness in the measurements laboratory. The instrument is self contained and AC operated. The three selective circuits are built in the instrument and thus without requiring any external accessories, provide a simple and effective means for restricting the response of the Null Detector to a narrow range resulting in the elimination of harmonics and noise outside the frequency range.

All controls are accessible from the front panel. All switching is accomplished by push buttons.

The Vacuum Tube Voltmeter is particularly adapted for measurements of the voltage across the unknown network connected in the bridge circuit. Due to the very high Input resistance (50 megohm) and low capacity (15 mmf) the balance of the bridge is unaffected by the Vacuum Tube Voltmeter, permanently connected across one of its arms. The instrument can also be used as a general purpose high input impedance Voltmeter particularly recommended for selectivity and voltage measurements across high Q resonant circuits. The instrument is self contained and AC operated. All controls are accessible from the front panel. A full scale calibration control is provided. All switching is accomplished by push buttons.

The meters of both instruments are protected against over loads.

Specifications:

NULL DETECTOR

INPUT IMPEDANCE: — 1 megohm in parallel with 25 mmf.

FREQUENCY RESPONSE: 2 Db from 20 to 20,000 cycles — 5 Db at 50,000 cycles.

NULL DETECTOR SENSITIVITY: At 1000 cycles, 100 microvolts will give a 15% meter deflection.

SELECTIVE AMPLIFIER: 23 Db second harmonic attenuation @ 60 cycles, 400 cycles and 1000 cycles.

VACUUM TUBE VOLTMETER

VOLTAGE RANGES: .01 volts to 100 volts in four ranges — (.1 — 1 — 10 — 100 volts at ¾ of scale.)

ACCURACY: 2% on full scale of all four ranges.

WAVEFORM ERROR: The instrument is a full wave average meter and is free of turnover effects. For small amounts of distortion the accuracy of the instrument is independent of the waveform.

FREQUENCY RANGE: 20 cycles to 20,000 cycles (1 Db).

INPUT IMPEDANCE: Equivalent to 50 megohms resistance in parallel with a 15 mmf condenser.

STABILITY: Effect of variation in line voltage from 100 volts to 125 volts is 2%. Effect in changes of tubes is less than .5%.

METER SCALE: Voltage scale calibrated from 0 to 150. Decibel scale calibrated from — 6 Db to + 3 Db.

TEMPERATURE AND HUMIDITY EFFECTS: The reading of the Voltmeter is unaffected by temperature and humidity variations of 65° F. to 95° F. and 0 to 90%.

TUBES: The Null Detector and Vacuum Tube Voltmeter requires the following tubes, all supplied with the instrument:

4 — 6J5	2 — 6SH7	1 — 6SN7	1 — 6C6
1 — 6SK7	1 — 6X5	2 — VR - 105	
1 — 6 - 8 volts pilot light		1 — 2 Amp fuse	

DIMENSIONS: Rack Mounting 19 x 9 x 11½".

NET WEIGHT: 25 Lbs.

PRICE: $325.00 Net F.O.B. Brooklyn, N. Y.

FREED TRANSFORMER COMPANY, Inc.

Instruments Division

1718 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

Printed in U. S. A.

FREED

D. C. Supply

TYPE No. 1170

Uses: The Type 1170 Power Supply is intended to be used as a dependable source of direct current for the Incremental Inductance Bridge Type No. 1110. The supply can also be used as a general laboratory substitute for a high voltage storage battery.

Description:

The Type 1170 D.C. supply consists of an electronically regulated high voltage supply. Four independent control circuits provide four current ranges, namely 5 milliamperes, 25 milliamperes, 100 milliamperes and 500 milliamperes. The output current is indicated on a multirange d.c. meter.

Features:

Separate controls for continuous variation of current are provided for the four different ranges. Extremely low hum and a constant output voltage independent of line and load variations, and an extremely low internal resistance makes it possible to use the regulated supply instead of a storage battery. All controls are accessible from the front panel. The four current ranges of the meter are independently fused.

Specifications:

CURRENT RANGES: Four current ranges — 0-5 MA, 0-25 MA, 100 MA and 500 milliamperes.

VOLTAGE RANGES: The maximum no-load voltages corresponding to the four current ranges are the following: 500 MA – 270 volts, 100 MA – 270 volts, 25 MA – 55 volts, 5 MA – 25 volts. On both 500 MA and 100 MA range with the control set to zero, the output voltage is independent of the load.

VOLTAGE REGULATION: The unit operates from a 115 volts, 50-60 cycle line. For a line variation of plus or minus 10%, the output voltage shall not vary more than ± 1½%.

POWER CONSUMPTION: Under 500 MA full load the power consumption is 360 watts. Under no load conditions the consumption is 150 watts.

HUM LEVEL: On the 270 volt, 500 milliampere range the hum level under full load condition is 6 millivolts which corresponds to – 92 Db.

TUBES: The instrument uses and is supplied with the following tubes and accessories:

3 — 5V4 3 — 6AS7
1 — OA2 1 — (6-8) volt pilot lamp
1 — .8 amp fuse, 1 — .2 amp fuse, 1 — 1/16 amp fuse and 1 — .01 amp fuse

MOUNTING: The instrument is supplied for mounting on a 19 inch relay rack or for cabinet mounting.

DIMENSIONS:

	W	D	H
Rack:	19" x	13 3/16" x	12¼"
Cabinet:	21½" x	15" x	14"

NET WEIGHT: Rack — 68 Lbs.; Cabinet — 89 Lbs.

PRICE: $275.00 Net, F. O. B., Brooklyn, N. Y.

FREED TRANSFORMER COMPANY, Inc.

Instruments Division

1718 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

Printed in U. S. A.

FREED
No 1020-B
MEGOHMMETER

Uses

The Freed Type 1020-B Megohmmeter is a self-contained and a-c operated instrument equally useful in the laboratory or for production testing of the leakage resistance of insulation materials, condensers, cables, motors and transformer windings.

Description

The instrument is a direct reading precision balanced electronic ohmmeter with a 500 volt d-c test potential included as a part of the unit. The insulation resistance is measured in six overlapping ranges and is indicated by a four inch meter, protected against overload. A relay, operated from the front panel disconnects the high voltage from the test terminals and eliminates all danger of shock due to exposed high potential. In the stand-by position (when push-button is released) a resistance between the high voltage terminal and chassis (ground) discharges condenser under test, eliminating danger of shock when disconnecting the component.

Resistance values indicated directly on a four inch meter which is protected against overload.

Rapid and safe to use, test voltage removed from terminals and capacitive component discharged to ground in all positions of multiplier switch.

Low resistance in series with component under test provides very short charging time for even the very largest capacitors. Calibration position provided to check accuracy of 500 volts d-c potential. 500 volt test supply electronically regulated.

Description

RANGE: 1 megohm to 2,000,000 megohms in six overlapping ranges selected by a multiplier switch.

SCALE: Resistance is indicated on easy to read four inch meter which is protected against overload.

ACCURACY: Plus or minus 3% on resistance values up to 100,000 megohms; plus or minus 5% from 100,000 to 2,000,000 megohms.

VOLTAGES ON UNKNOWN: The voltage applied to the unknown terminals is 500 volts d-c and is independent (less than 1%) of the value of the unknown.

STABILITY: Line voltage variations from 105-125 volts will cause less than 2% variation in the meter reading.

TERMINALS: Four terminals are provided, two for connecting the unknown, one guard and one ground. As a safety feature, when pushbutton is released, the test voltage is removed from the terminals. This permits connections to be made without danger of shock in all positions of the selector switch.

CONTROLS: A range selector, zero adjust and calibration switch. Zero adjust control for setting meter scale to infinity. Pushbutton switch for activating relay which applies test voltage to terminals and when released discharges capacitive component of the unknown. A.C. on-off switch.

TUBES:

1 — 6C4	1 — 2X2-A
1 — 6AU6	1 — 6X4
1 — 12AU7	1 — OB2
1 — 5651	

POWER SUPPLY: 105-125 volts A.C. 50-60 cycles 30 Watts.

CABINET: Portable and of all metal construction.

DIMENSIONS: 9½" x 10½" x 8"

NET WEIGHT: 18 pounds.

ACCESSORIES SUPPLIED: Test leads with [illegible] tips consisting of color coded test prods and alligator clips

FREED TRANSFORMER COMPANY, Inc.
Instruments Division
1718-36 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

FREED COMPARISON and LIMIT BRIDGE TYPE NO. 1010

Uses

This instrument is a comparison and limit bridge for use in both laboratory and production testing of resistors, condensers and inductors. The manufacturer of these components can use it for production tests, the user for incoming inspection and acceptance tests. The instrument is particularly useful for laboratory work (bridge or filters) where very accurate components are required.

Features

For precision and production testing, the bridge has many advantages. Power line operation and the visual indicator make the instrument completely self-contained. It can be used in noisy locations. Its small size and light weight permit the instrument to be moved easily and to be set up wherever necessary.

Description

The instrument is composed of an oscillator, a bridge and an amplifier. The oscillator feeds the frequencies into a bridge consisting of 2 fixed resistors, the unknown impedance and the standard. A variable resistor connected between the 2 fixed resistors makes it possible to read the percentage difference between the unknown and the standard, on a specially calibrated dial. A high gain amplifier indicates the balance of the bridge. The general method of testing is the comparison of an unknown component with a standard component of the same type. Accurate percentage measurements are obtained by the use of precision components in the arms of the bridge. The use of high gain amplifier and adequate internal shielding assures a very sharp and distinct balance.

A visual null indicator, consisting of a meter used in connection with the high gain amplifier makes it possible to use the No. 1010 Bridge as a precision limit bridge in production testing.

Specifications

FREQUENCY: Three frequencies are available: 50 to 60 cycles, 1000 cycles, and 10,000 cycles.

The 50 or 60 cycles are taken from the line.

The 1000 and 10,000 cycles are generated by an oscillator and are accurate to within 10%.

RANGE: Two comparison ranges are provided: 10% and 20%. They are selected by a rotary switch. In the 10% position the percentage is read directly on a calibrated dial. In the 20% position the reading of the dial is multiplied by two.

RESISTOR MEASUREMENTS: Resistors from 10 ohms up to 1 megohm are measured by the comparison method at 60 cycles. Resistors of greater value than 1 megohm can be measured by using the instrument as a limit bridge.

CONDENSER MEASUREMENTS: Condensers from 500 micromicrofarads up to 10 microfarads are measured by the comparison method at 1000 cycles. Condensers above 10 microfarads are measured by the comparison method at 60 cycles.

Small condensers 500 micromicrofarads to 25 micromicrofarads are measured at 1000 cycles, with the instrument used as a limit bridge.

INDUCTOR MEASUREMENTS: Inductors can be measured at 60 cycles, 1000 cycles or 10,000 cycles depending upon their values.

Ranges:

L—100Hy to 1 Hy	F— 60 cycles
L— 1Hy to .01 Hy	F— 1,000 cycles
L— .01Hy to .1m Hy	F—10,000 cycles

ACCURACY: On the 10% position the components can be adjusted to within an accuracy of .5%.
Components to be adjusted to ± 10% accuracy should be tested on the 20% position.

VOLTAGE APPLIED TO THE UNKNOWN: The voltage impressed across the unknown terminals varies with the absolute value of the unknown. The maximum voltage is 15 volts. The minimum voltage is .5 volts.

POWER SUPPLY: 105 to 125 volts, 50-60 cycles. The power consumption is 40 watts.

CONTROLS:

(a) Oscillator Controls—Frequency selector switch and output level control.

(b) Bridge Controls—Main percentage dial. "C balance," Range selector, 3 position switch (balance, 10% and 20%).

(c) Null Indicator Controls—5 step attenuator for the adjustment of the gain of the amplifier. Screw head adjustment for the zero of the vacuum tube volt meter.

VACUUM TUBES: All are supplied with the instrument.
1—6X5 1—6SL7 1—6J5 1—6V6 2—6SJ7

PORTABLE: Carrying cabinet of all metal construction.

DIMENSIONS: 10½" x 8¾" x 12".

NET WEIGHT: 15½ lbs.

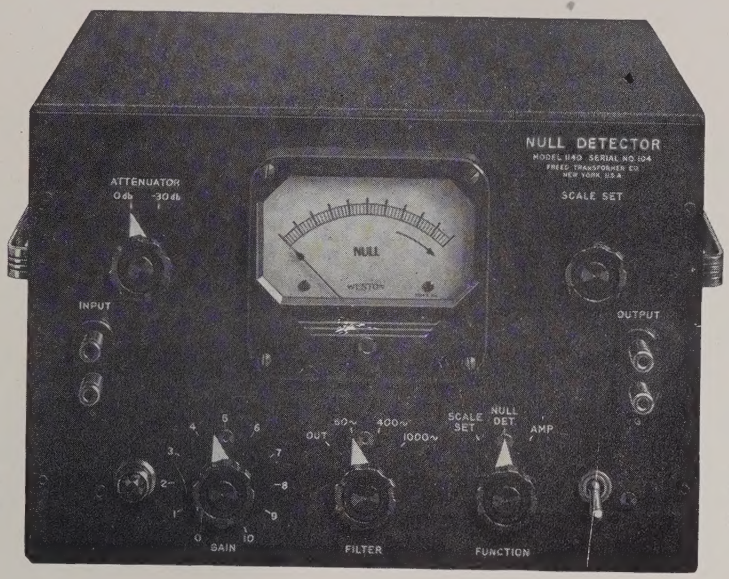
Printed in U. S. A.

FREED TRANSFORMER COMPANY, Inc.
Instruments Division
1718-36 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

FREED

NULL DETECTOR — AMPLIFIER

Model 1140



Uses

The Freed Model 1140 Null Detector Amplifier is a sensitive null indicator for bridge measurements, providing visual null indications or aural when used in conjunction with head-phones. The unit may also be used as a high gain amplifier for general laboratory work.

Description

Functionally the instrument consists of a high gain linear amplifier with a 30 db. input attenuator in addition to the variable gain control. A four inch panel meter provides visual null indications, the response of the meter circuit is approximately logarithmic over a 40 db. voltage range. Resonant circuits tuned to 60, 400 and 1000 cycles limit the amplifier transmission characteristics to the three audio frequencies commonly used for bridge measurements. This feature controlled by a front panel switch permits the discrimination of frequencies outside the band pass, resulting in the elimination of harmonics and overall noise. The input and output circuits are isolated from DC by blocking condensers. Connections are made by using convenient binding posts.

Specifications

INPUT IMPEDANCE: 1 megohm in parallel with 25 mmf.

GAIN: 98 db. with 1 megohm load (6 mmf. shunt capacity), down 1.5 db. at 25,000 cycles, down 5 db. at 50,000 cycles, down 2 db. at 20 cycles.

NULL DETECTOR SENSITIVITY: At 1 Kc. 100 microvolts will give a 15% meter deflection.

SELECTIVE AMPLIFIER: 23 db. second harmonic attenuation at 50, 400 and 1000 cycles.

OUTPUT IMPEDANCE: Approximately 50,000 ohms.

OUTPUT VOLTAGE: 40 volts undistorted into 1 megohm load, 10 volts into 20,000 ohms.

TUBES: 1 – 6C6, 1 – 6SH7, 1 – 6SK7, 1 – 6SN7, 1 — VR-150, and 1 – 6X5 supplied with the instrument.

TEMPERATURE AND HUMIDITY EFFECTS: Over the normal range of temperature and humidity variation (65 degrees F. to 95 degrees F., 0 to 95% relative humidity the accuracy is substantially unaffected by temperature and humidity conditions. An excessive increase in temperature may necessitate the zero and full scale readjustment of the meter.

POWER SUPPLY: 105–125 volts, 50–60 cycles, 35 watts consumption.

MOUNTING: This instrument can be supplied in cabinet model (Type No. 1140) or in a standard relay rack mount with dust cover (Type No. 1140R).

DIMENSIONS: (Type No. 1140) 13½" x 8½" x 10" overall
(Type No. 1140R) 19L. x 7W. x 9D.

WEIGHT: 24 lbs.

PRICE: (Type No. 1140) $195.00 F.O.B., Brooklyn
(Type No. 1140R) $205.00 F.O.B., Brooklyn

Printed in U. S. A.

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MP MASTER
MA34243